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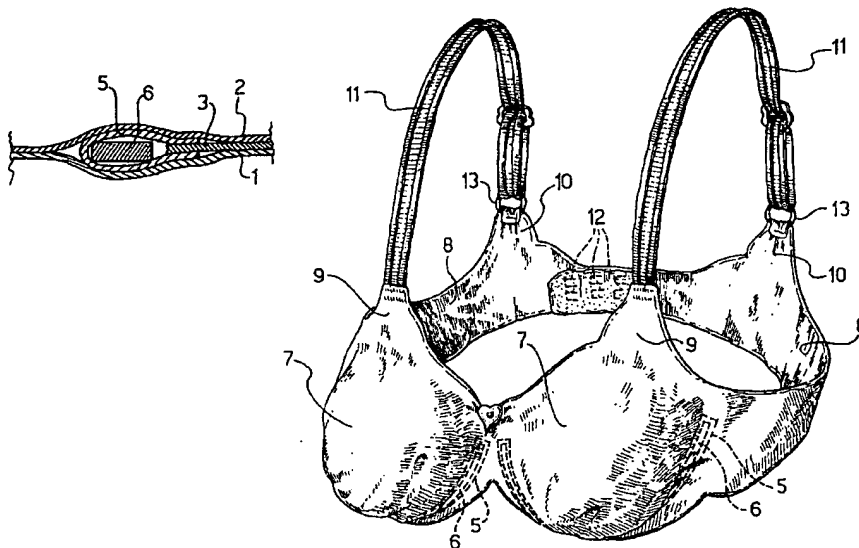
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ance Notes on Codes and Abbreviations" appearing at the begin-  
ning of each regular issue of the PCT Gazette.

(54) Title: **STIFFENED BRASSIERE**



(57) Abstract: A stiffened brassiere is made using at least two superimposed layers of fabric (1, 2) between which stiffening elements (6) are inserted; the two layers of fabric (1, 2) are joined together by means of adhesive bonding and are then shaped so as to form the cups and the side bands of the brassiere. This stiffened brassiere is more comfortable than the stiffened brassieres of the prior art.

WO 02/07548 A1

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- 1 -

## DESCRIPTION

## "Stiffened brassiere"

The present invention relates to a stiffened brassiere.

5       As is known, brassieres comprise two cups which are joined together, two side bands which extend out from the cups and are adapted to be fastened to one another, and two shoulder straps, each of which is attached at one end to one of the cups and at the other to the corresponding  
10 side band. Certain types of brassieres are strapless.

These brassieres are usually made from pieces of fabric which are stitched together in some suitable way to produce the abovementioned structure.

A stiffened brassiere has stiffening elements which  
15 are generally positioned along the bottom part of the cup so as to provide a high degree of support for the bust. These stiffening elements usually consist of two curved wires housed in tubular fabric casings which are sewn onto the inside of the brassiere.

20       Unfortunately, stiffened brassieres are not very comfortable to wear.

This is because, in addition to the discomfort caused by the seams joining together the pieces of fabric - which are also present in brassieres without  
25 underwiring or "soft" brassieres - there is the added

discomfort of the underwires and their casings.

The seams joining together the pieces of fabric can be uncomfortable because they form irregularities on the brassiere's surface which can cause irritation when they  
5 come into contact with the skin, especially when you consider the relative movements that take place between the brassiere and the skin.

The underwires are even more uncomfortable precisely because they are rigid elements which press against the  
10 skin through the casings. Moreover, the fact that the casings with the underwires protrude wholly towards the inside of the brassiere just exacerbates the situation. The casing seams, like the other seams, constitute a further source of discomfort.

15 It should also be said that, over time, the seams are subject to wear and can therefore come undone, with the risk of the whole brassiere falling apart.

The object of the present invention is to provide a stiffened brassiere which is more comfortable than those  
20 of the prior art.

This object is achieved by means of a stiffened brassiere comprising two cups which are joined together, two side bands which extend out from the cups and can be fastened to one another, and stiffening means which  
25 reinforce the structure of the brassiere, characterized

- 3 -

in that it is made using at least two superimposed layers of fabric between which the stiffening means are inserted, the two layers of fabric being joined together by means of adhesive bonding and being shaped so as to  
5 form the cups and the side bands.

In order to gain a better understanding of the invention, a description is given below of a non-limiting exemplary embodiment thereof, which is illustrated in the appended drawings, in which:

10 Figs 1, 2, 3, 4 show perspective views of the consecutive stages of production of a brassiere according to the invention;

Fig. 5 is a cross section on the plane V-V of a detail of the brassiere structure shown in Fig. 4;

15 Fig. 6 shows the bra according to the invention in its final configuration.

With reference to Fig. 1, the latter shows an exploded view of some of the components of the brassiere according to the invention.

20 Two layers of fabric 1, 2 of the same shape and having a certain degree of elasticity, fitted to be superimposed, are provided.

A third layer of fabric 3 is also provided, which is smaller and less elastic than the layers of fabric 1, 2.

25 The layer of fabric 3 has two adjacent curved edges 4

- 4 -

along which two corresponding curved tubular casings 5 are stitched. A corresponding curved wire 6 with a flattened cross section is inserted into each casing 5 and the ends of the casing are then sewn shut so as to  
5 enclose the wire in the casing.

The three layers of fabric 1, 2, 3 are placed one on top of the other and are joined together by means of adhesive bonding, inserting the layer of fabric 3, with the casings 5 and the wires 6, between the layers of  
10 fabric 1, 2 as shown in the sequence of Figs 1 and 2. This joining by means of adhesive bonding can involve gluing, for example using a thermoadhesive resin which is spread in a suitable manner onto the surfaces of the layers of fabric 1, 2, 3 which need to be joined  
15 together. The adhesively bonded joint can also, as long as suitable fabrics have been selected, be made by heat-bonding or heat-fusing the fabric fibres, or by using other similar systems.

At this point, as shown in Fig. 3, the brassiere  
20 structure thus formed is pre-shaped using heat in order to produce two cups 7 in the region of the casings 5 containing the wires 6.

As may be seen in Fig. 4, the bra structure with the pre-shaped cups 7 is then cut out so as to produce the  
25 final brassiere shape with side bands 8 and with the

- 5 -

areas around the cups 7 following the line of the cups themselves. These areas around the cups 7 extend to form two extension pieces 9 on the side opposite the side with the wires 6. Two extension pieces 10 also extend from the  
5 free ends of the side bands 8, on the same side as the extension pieces 9.

The brassiere structure shown in Fig. 4 is completed by attaching shoulder straps to the extension pieces 9 and 10 and by applying fastening elements to the ends of  
10 the side bands 8 so as to give the finished brassiere shown in Fig. 6, where the shoulder straps are denoted by the reference 11 and the fastening elements by the reference 12. The shoulder straps 11 are attached to the extension pieces 10 by means of rings 13. The fastening  
15 elements consist of eyes attached to one of the two side bands 8 and of corresponding hooks attached to the other side band of the brassiere. The wires 6 are positioned along the bottom part of the cup so as to provide a high degree of support for the bust.

20 Although the brassiere in Fig. 6 is a stiffened brassiere since it is fitted with the wires 6, it is still comfortable.

First and foremost, there are no external seams and so irritation to the skin is avoided. The only seams  
25 present - those on the casings 5 containing the wires 6 -

- 6 -

are enclosed between the two layers of fabric 1, 2 and so do not come into contact with the skin.

With reference to Fig. 5, the fact that the casings 5 containing the wires 6 are compressed between the two layers of fabric 1, 2 means that their thickness is reduced and, in addition, that they protrude towards the outside as well as towards the inside of the brassiere. All these features make the brassiere more comfortable than those of the prior art as mentioned in the introduction, in which the casings containing the wires are not compressed and so protrude towards the inside.

The flattened shape of the wires 6 reduces the extent to which they protrude and so makes an appreciable contribution to increasing comfort.

The fact that the only seams - those of the casings 5 - are enclosed between the two layers of fabric 1, 2 allows them to be protected against wear.

It should also be added that since the casings 5 are narrow and enclosed between the two layers of fabric 1, 2, they do not need to be secured to the layer of fabric 3 by strong seams. Furthermore, the wires 6 are securely enclosed within the casings 5 and the two superimposed layers of fabric 1, 2, so that there is no way that they can come out.

In order to attach the shoulder straps 11 to the

- 7 -

cups 7 and the fastening elements 12 to the side bands 8, seams can be made which, although external, are extremely unobtrusive. Alternatively, if it is desired not to use seams at all in these finishing operations, other  
5 attachment and closure systems - for example heat-bonding systems - can be used.

Thanks to the elasticity of the two layers of fabric 1, 2, there is no need to use elastic tape along the edges of the brassiere.

10 The brassiere of Fig. 6 is also very pleasing from the aesthetic viewpoint, given that there are no seams or elastic tapes; this gives the effect of the brassiere being in a single piece.

It is of course possible to make variations and/or  
15 additions to the embodiment described and illustrated.

It would be possible to do without the intermediate layer of fabric 3 and the casings 5 sewn to it, positioning the wires 6 directly between the two layers of fabric 1, 2. However, the solution illustrated is  
20 effective to assemble; moreover, the intermediate layer of fabric 3 reinforces the central part of the brassiere.

The wires can have a different cross section from the one illustrated, although a flattened cross section of the wires is, as seen above, advantageous.

25 Said wires could be replaced with other similar



stiffening elements. Another possibility would also be to insert silicone material into the casings, which would also act as a stiffening element.

In general the stiffening elements can be of any  
5 shape and size, they can vary in number and can be placed in any suitable position in the brassiere, depending on the various technical reinforcing requirements.

The general shape of the brassiere can be varied to meet different aesthetic and/or functional requirements.

10 The brassiere can also be a strapless brassiere.

## CLAIMS

1. Stiffened brassiere comprising two cups (7) which are joined together, two side bands (8) which extend out from the cups (7) and are adapted be fastened  
5 to one another, and stiffening means (6) which reinforce the structure of the brassiere, characterized in that it is made using at least two superimposed layers of fabric (1, 2) between which the stiffening means (6) are inserted, the two layers of fabric (1, 2) being joined  
10 together by means of adhesive bonding and being shaped so as to form the cups (7) and the side bands (8).

2. Brassiere according to Claim 1, in which a third layer of fabric (3) is inserted between the first two layers of fabric (1, 2) and to which the stiffening  
15 means (6) are secured.

3. Brassiere according to Claim 2, in which casings (5) in which the stiffening means (6) are housed, are sewn onto the third layer of fabric (3).

4. Brassiere according to Claim 3, in which the  
20 third layer of fabric has two edges (4) in the shape of an arc of a circle, which are positioned along the bottom part of the cups (7) and along which the casings (5) are stitched.

5. Brassiere according to any one of the preceding  
25 claims, in which the first two layers of fabric (1, 2)

- 10 -

are elastic.

6. Brassiere according to Claim 5 when dependent upon any one of Claims 2, 3, 4, in which the third layer of fabric (3) is less elastic than the first two layers  
5 of fabric (1, 2).

7. Brassiere according to any one of the preceding claims, in which the stiffening means consist of wires  
(6).

8. Brassiere according to Claim 7, in which the  
10 wires (6) are curved and positioned along the bottom part of the cups (7).

9. Brassiere according to Claim 7 or 8, in which the wires (6) have a flattened cross section.

10. Brassiere according to Claim 3 or 4, in which  
15 the stiffening means consist of silicone material inserted into the said casings.

11. Brassiere according to any one of the preceding claims, in which the layers of fabric are joined together by means of gluing.

20 12. Brassiere according to any one of Claims 1 to 10, in which the layers of fabric are joined together by means of heat-bonding.

13. Brassiere according to any one of the preceding claims, additionally comprising two shoulder straps (11),  
25 each of which is attached at one end to one of the cups

- 11 -

(7) and at the other end to the corresponding side band (8).

14. Process for manufacturing the brassiere according to any one of the preceding claims, comprising  
5 the following stages:

- superimposing the layers of fabric and inserting the stiffening means (6) between them and joining the layers of fabric together by means of adhesive bonding;
- shaping the cups (7);
- 10 - cutting the layers of fabric so as to form the side bands (8) and to shape the area around the cups (7); and
- attaching fastening elements (12) to the side bands (8).

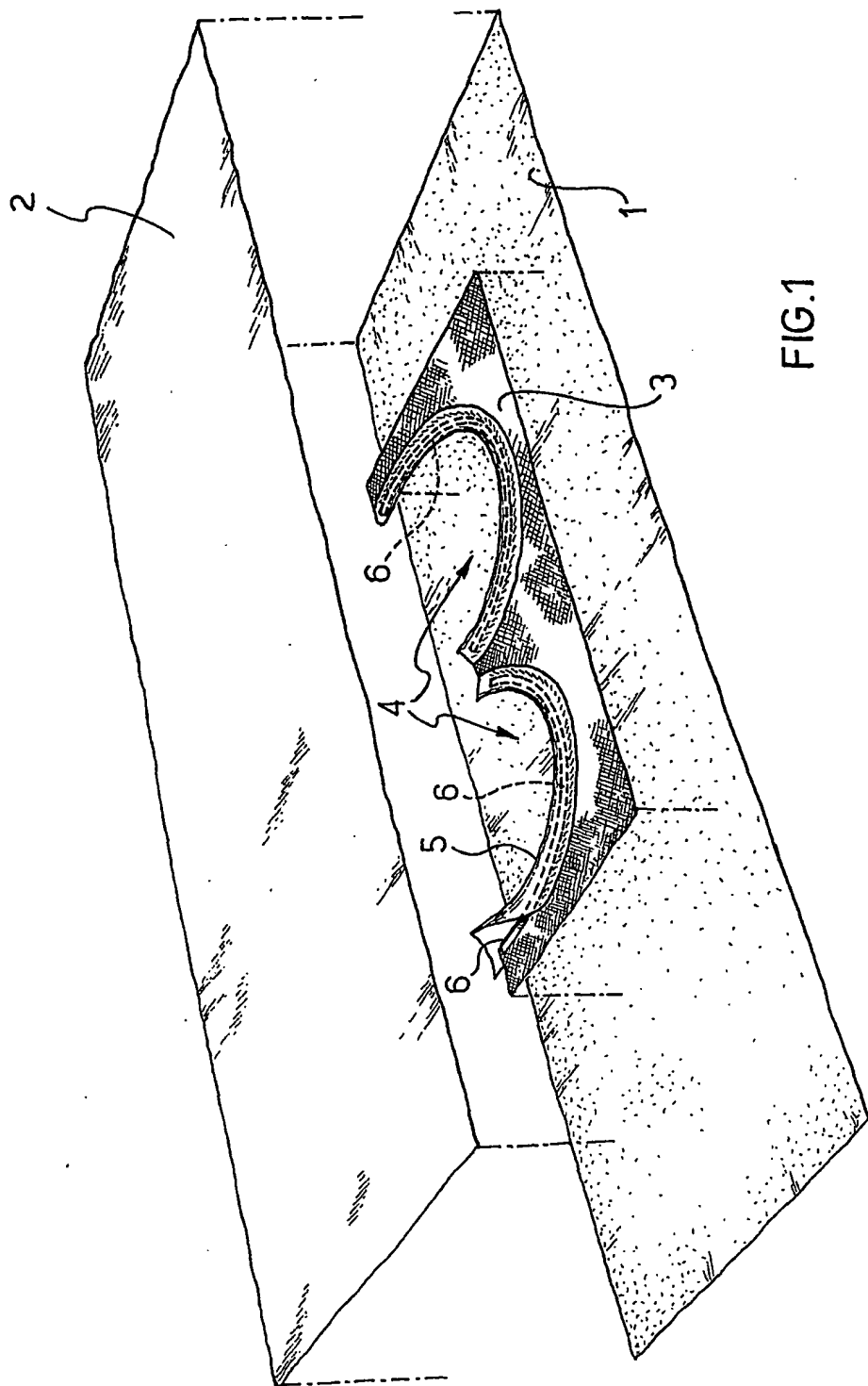
15 15. Process according to Claim 14 when dependent upon Claim 3 or 4, in which the casings (5) are sewn onto the third layer of fabric (3) and the stiffening means (6) are then inserted into the casings (5) before the stage of the superimposing of the layers of fabric.

20 16. Process according to Claim 14 when dependent upon Claim 13, in which, during the stage when the fastening elements (12) are attached to the side bands (8), the shoulder straps (11) are also attached to the cups (7) and to the side bands (8).

25 17. Process according to any one of Claims 14, 15, 16, in which the cups (7) are shaped by means of

thermoforming.

1/5



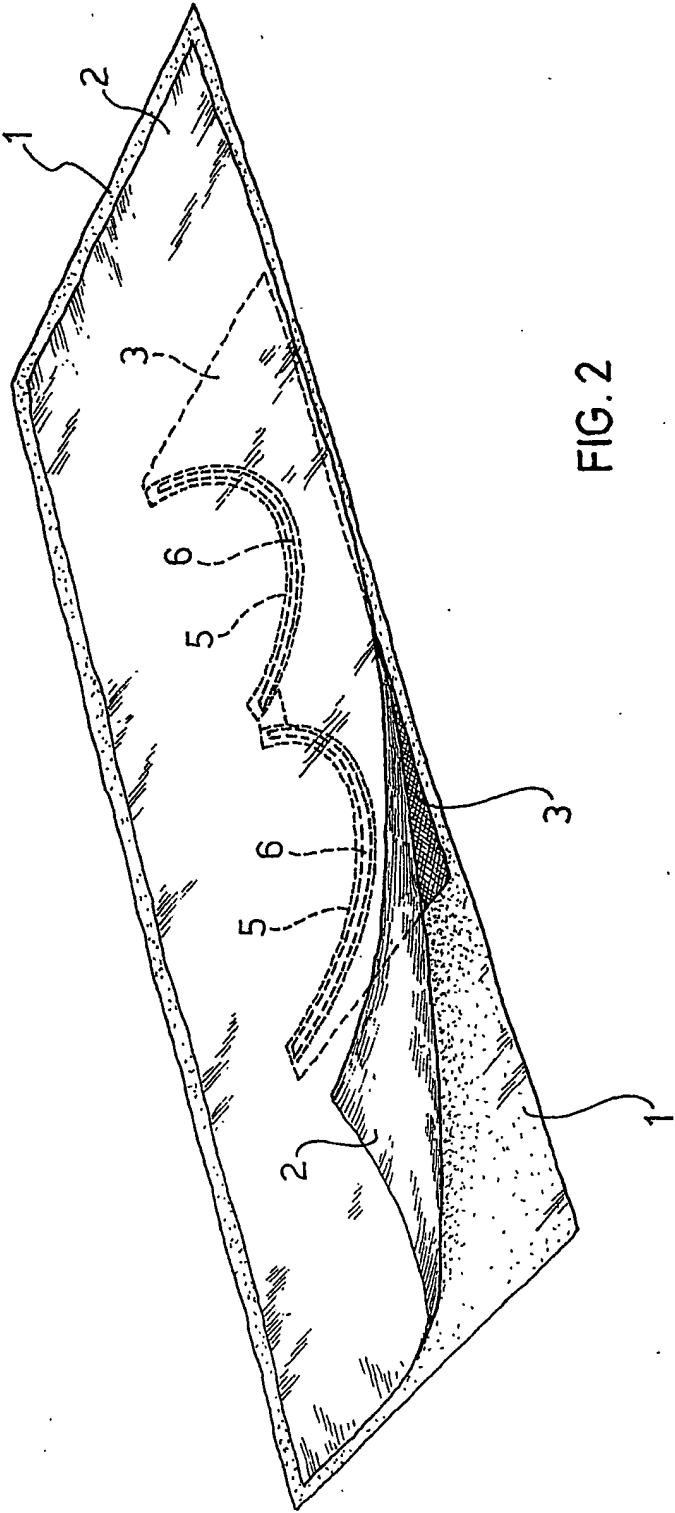


FIG. 2

3/5

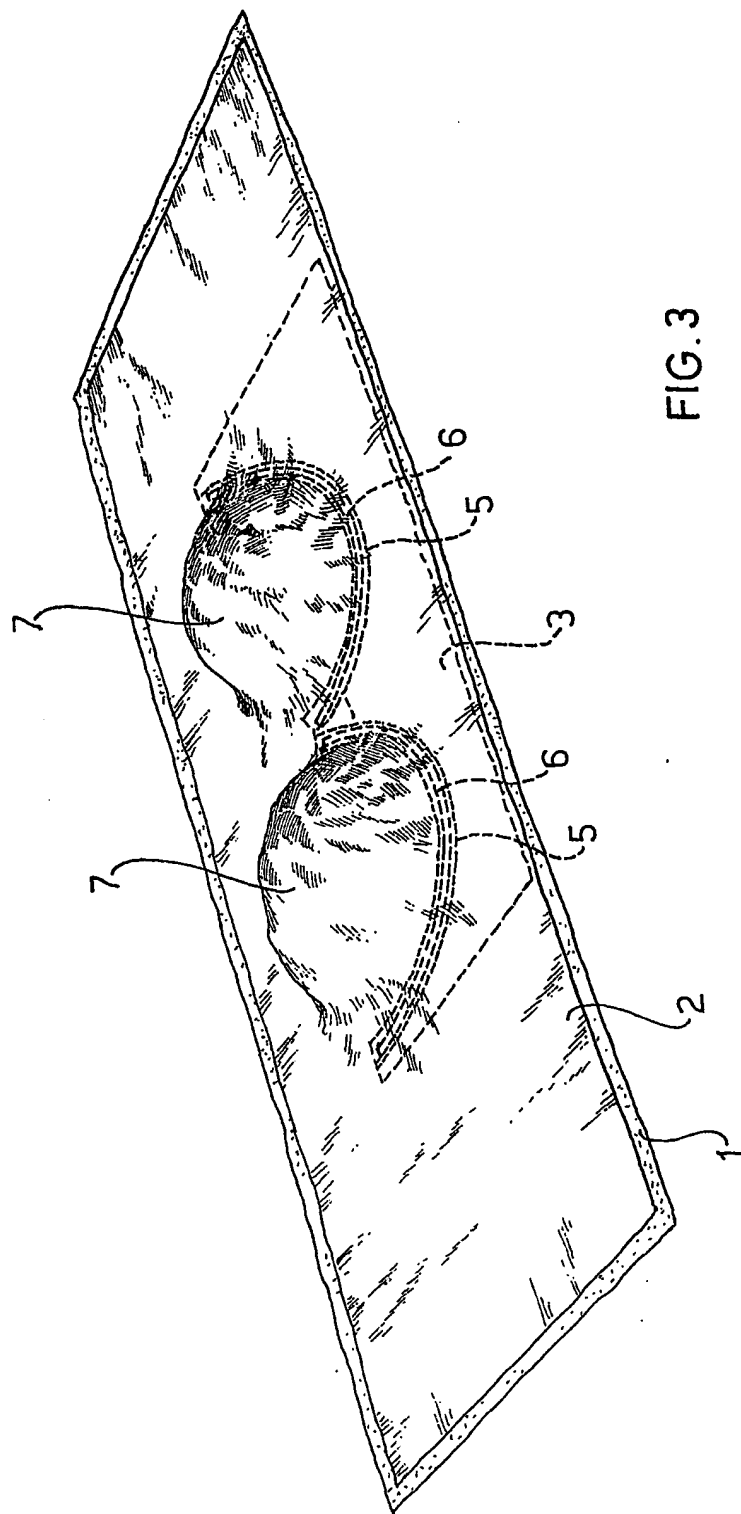


FIG. 3



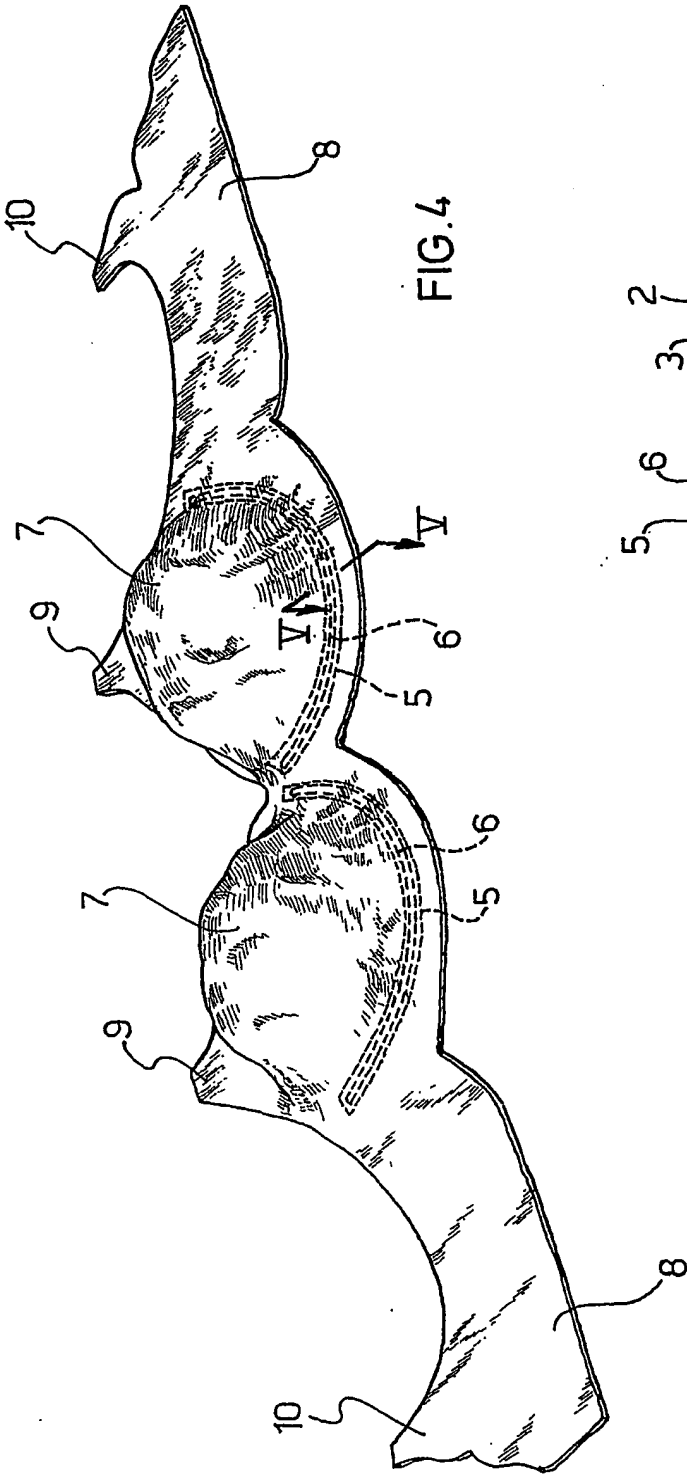


FIG. 4

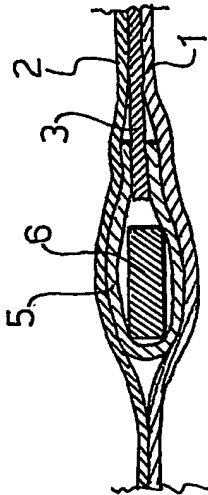


FIG. 5

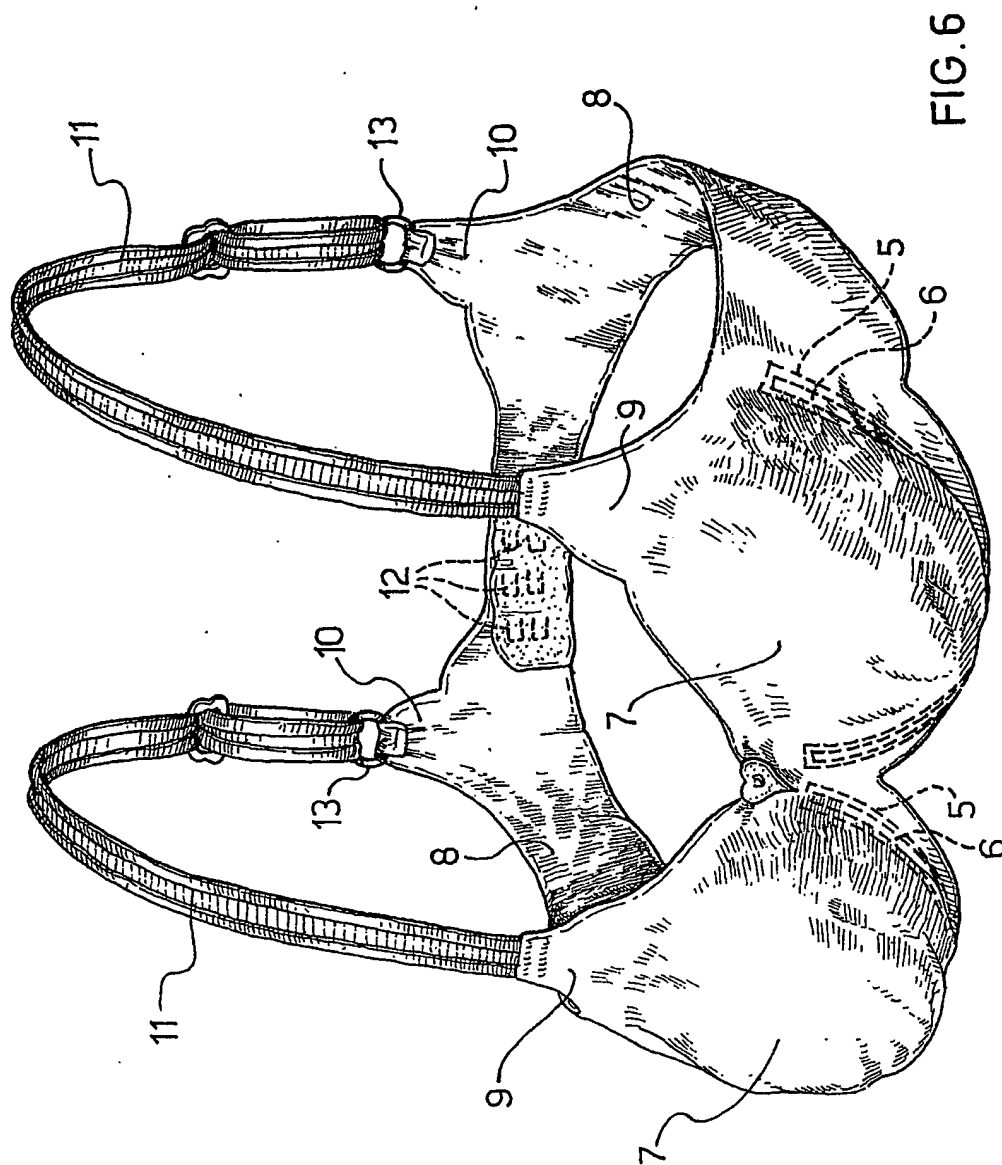


FIG. 6

## INTERNATIONAL SEARCH REPORT

Intern Application No  
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## A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 A41C3/00 A41C5/00

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 A41C

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 5 820 443 A (BURR REINHOLD MARKUS) 13 October 1998 (1998-10-13) column 2, line 15 column 3, line 25 - line 35 column 5, line 29 - line 36; claims 1,2; figures 1,5,6	1,2,5,6
Y	DE 298 10 765 U (TRIUMPH INTERNATIONAL AG) 28 October 1999 (1999-10-28) page 1, line 9 - line 15 page 2, line 12 - line 24 page 3, line 17 - line 20 page 4, paragraph 4 page 4, paragraph 6; claims 1,3-5,7; figures 2-6  --- -/--	1-17

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT		
Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	FR 1 362 777 A (BAYER) 23 September 1964 (1964-09-23) page 1, column 2, paragraph 2 page 2, column 2, line 39 -page 3, column 1, line 21; figures ----	1-17
A	US 5 447 462 A (SMITH EUGENE A ET AL) 5 September 1995 (1995-09-05) column 5, line 15 - line 22 column 8, line 17 - line 18; figures 2,11-14 ----	1,2,5
A	US 3 726 286 A (WOLFSON F) 10 April 1973 (1973-04-10) column 1, line 66 -column 2, line 12 column 4, line 5 - line 24 column 5, line 53 - line 54; figure 9 ----	1,7-9
A	EP 0 852 915 A (SALTEK S R L) 15 July 1998 (1998-07-15) claim 1; figures ----	1,14-17
A	EP 0 604 812 A (TRIUMPH INTERNATIONAL AG) 6 July 1994 (1994-07-06) column 2, line 32 - line 43 column 2, line 50 - line 51; figures -----	1

## INTERNATIONAL SEARCH REPORT

Information on patent family members

Intern of Application No

PCT/IT 00/00306

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
US 5820443 A	13-10-1998	DE 29609672 U	02-10-1997
		AT 183895 T	15-09-1999
		BR 9703413 A	15-09-1998
		CN 1174686 A	04-03-1998
		CZ 9701669 A	17-12-1997
		DE 59700380 D	07-10-1999
		DK 809945 T	27-03-2000
		EP 0809945 A	03-12-1997
		ES 2138414 T	01-01-2000
		GR 3031946 T	31-03-2000
		HR 970300 A	30-04-1998
		HU 9700969 A, B	28-11-1997
		JP 3057027 B	26-06-2000
		JP 10088405 A	07-04-1998
		NO 972431 A	01-12-1997
		PL 320245 A	08-12-1997
		RU 2127535 C	20-03-1999
		SI 809945 T	31-12-1999
		SK 68497 A	10-12-1997
DE 29810765 U	28-10-1999	NONE	
FR 1362777 A	23-09-1964	BE 633167 A	
		CH 408830 A	15-03-1966
		GB 990662 A	28-04-1965
		IT 699907 A	
		NL 293897 A	
US 5447462 A	05-09-1995	AU 657430 B	09-03-1995
		AU 4498393 A	27-10-1994
		BR 9307831 A	12-12-1995
		CA 2120991 A	14-10-1994
		JP 8509033 T	24-09-1996
		WO 9423601 A	27-10-1994
		ZA 9304695 A	01-03-1994
US 3726286 A	10-04-1973	NONE	
EP 0852915 A	15-07-1998	IT MI970044 A	13-07-1998
		US 6000994 A	14-12-1999
EP 0604812 A	06-07-1994	DE 9217736 U	22-07-1993
		AT 155014 T	15-07-1997
		ES 2105058 T	16-10-1997
		HK 1012217 A	31-03-2000

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